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# Architectural Design Education Program for Children: Adaptation into Turkish Culture and Analysis of its Effectiveness

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## Abstract

*Problem Statement*: Design, which is a process of creating, supports individuals' pursuit, experience and discovery, and contributes to the improvement of higher-order thinking skills. A systematic design education offered in the early years of life boosts especially creative thinking and problem solving skills as well as awareness of the environment and nature. Such education programs have been implemented continuously in Europe and America. However, in Turkey, there is no design education for children.

*Purpose of the Study*: This research aims to adapt into Turkish culture the Architectural Design Education Program for American preschool and primary school children aged 6-11 and to analyze its effectiveness in improving the design skills of Turkish children. The effectiveness of the program is examined within the sub-question if there are any statistically significant differences between the experimental groups instructed by adapted program and the control groups instructed by conventional activities in the concept of design skills exhibited through performance-based assessments particular to each instructional session.

*Method*: The Architectural Design Education Program was adapted into the Turkish culture through studies carried out with expert groups. In the academic year 2011-2012, 177 children were given this education program in a primary school in Ankara. These students constituted six

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experimental groups that represented all levels of grade/age (i.e. preschool and primary education from 1st to 5th year students/aged 6-11). On the other hand, a total of 167 children in six control groups received a program consisting of conventional activities. Analytic rubrics were used to assess, at the end of each instructional session, the products designed by children in line with performance tasks. With a view to comparing the design skills of children in different programs, Mann Whitney U-test for independent samples was used for analysis.

*Findings*: The analyses show that there are significant differences in the development of design skills between the experimental groups and the control groups at all levels of grade/age, and that the difference was in favor of the experimental groups.

*Conclusion and Recommendations*: The results show that all instructional activities carried out within the scope of the Architectural Design Education Program are effective in social, emotional and cognitive development of children aged six to 11, improving their higher-order thinking processes based on design skills. It is recommended that this interdisciplinary program, making use of mathematics, history, science and arts, should be integrated with basic areas of instruction in education programs so that its effectiveness can be enhanced.

*Keywords*: Children, design, creativity, problem solving, education.

## Introduction

On a global level, creative thinking and the ability to bring about innovation are important factors in the development of society. Hence, The European Council agreed to declare 2009 the Year of Creativity and Innovation by defining the objective of the year as promoting creativity for the development of personal, occupational, entrepreneurial and social competences through lifelong learning (European Commission, 2008, p. 5). As the ability to think creatively has been crucial, Rauth, Köppen, Jobst, and Meinel (2010) stated that design is a way of expressing and improving this skill in a certain way. Design is defined as the process of presenting ideas to form a new product in order to bring an aesthetic harmony into the physical world through creativity and problem-solving skills (Lindberg & Meinel, 2010; Woodman, 1993; Zeisel, 2006).

Several researches that are theoretically based on environmental, architectural and experimental psychology showed that the design of spaces and psycho-social environments has a significant influence on people's—especially children's—values, attitudes, achievements and learning processes (Bresnahan, 2014; Şahin, Tantekin-Erden, & Akar, 2011; Taylor, 1993). Making individuals a part of the design process (in other words, teaching design beginning at an early age) utilises and improves problem-based learning and creativity (Faizi, Azaria, & Maleki, 2013; Kinchin & O'Connor, 2012; Lozanovska & Xu, 2012; Meskanen & Hummelin, 2010; Taylor,

1993). Based on the constructive and experimental properties of the design process, which provides opportunities for children that help them gain competency in aesthetic judgement and form their own personal relationships with the built environment, design is no longer a field of activity where only adult professionals produce. Accordingly, the architecture and design education for children and young people was discovered in the 1980s and particularly in the 1990s as a part of general education policies in various cultures and countries in the world such as Finland, Austria, Colombia, Norway, Spain, Estonia, Japan, Mallorca, Hungary, United Kingdom, the United States and Panama. Thus, during the last 20 years, the concept of designing with children has established its place not only in continuous education programs (e.g. the K-12 education program by the Boston Society of Architects-AIA titled Learning by Design and the after-school design activities by Arkki School of Architecture for Children and Youth in Finland), but also in institutional initiatives intended to create design-centric curriculums, pedagodical models and projects for schools, museums and youth clubs (Meskanen, 2004; Tekkaya-Poursani, 2009; Räsänen, 2014). One of the most well-known programs in this concept is the Architectural Design Education Program for Children (Taylor, 1993; Taylor & Vlastos, 1983; Taylor, Vlastos, & Marshall, 1991). This multi-disciplinary program, having been implemented in United States schools for approximately three decades, has been developed for preschool and primary school-aged children and aims to enable them to acquire design skills. Based on the premise that all individuals are designers, the program is of particular importance as it allows children to use their creativity and problem-solving skills in a way that supports various developmental areas and treats each and every space as a learning environment (Taylor, Aldrich, & Vlastos, 1988). This nature of the Architectural Design Education Program gains more importance considering that children become owners of the cultural heritage and architects or users of the architecture. However, in Turkey, there is no systematic design education for children.

Probably the only noteworthy study conducted in Turkey to develop children's perception of space was "1000 Architects in 1000 Schools" launched in 2002 by the Ankara Chamber of Architects. In this project, 1300 children were offered education to help them gain environmental and spatial awareness and a consciousness of urban life. However, the architects offering the program reported having had problems knowing how to involve children in design processes because they did not know much about children's cognitive developmental characteristics (Gözcü, 2005). This is a case illustrating the importance of the contribution of educational sciences to a design education program for children. The objectives of this study are defined as follows:

1. Adapt into Turkish culture the Architectural Design Education Program for children from preschool to the 5$^{th}$ year of primary education (ages six to 11).
2. Analyze the effectiveness of the Architectural Design Education Program in improving the design skills of children in the Turkish context.

The following sub-question was used to test the effectiveness of the program: "Are there any statistically significant differences between the experimental groups instructed by the adapted Architectural Design Education Program and the control groups instructed by conventional architectural design activities in the concept of design skills exhibited through performance-based assessments particular to each instructional session?"

## Method

*Research Design*

The adaptation process is a qualitative study that involves arrangements and descriptive analyses required for the use of an American design education program in the Turkish culture. The effectiveness of the program was examined through a quantitative research of an experimental design. Within the scope of this model, the adapted program was used in the experimental groups, and the control groups were offered conventional design activities. Because performance-based assessments were performed after the design activities, a pre-test was not conducted; a posttest-only control group design was carried out.

*Research Sample*

*Participants in the adaptation process of the Architectural Design Education Program.* Experts were included in the adaptation process. The prerequisite was volunteering for the study. Criterion sampling was used for the establishment of expert groups. Accordingly,

- The criteria considered for the process of translating the program content into Turkish and back-translation were "a good mastery of the English language, a graduate degree in arts, aesthetics or design, and experience in the application of these fields." Two groups consisting of architects and experts in child development and preschool education who fulfill the above criteria worked on the linguistic equivalence of the program. Then, a new group consisting of architects and Turkish language experts, English language experts, program development experts, preschool educators, child development specialists, and educational assessment experts worked on the experiential, conceptual and semantic equivalence of the program.
- The criteria considered for redesigning the program with elements specific to the Turkish culture were "a graduate degree in arts, aesthetics or design, and experience in the application of these fields." In this vein, a group of architects and child development specialists, preschool educators, and program development experts made some revisions on the program. To finalize the program, each module was evaluated individually by a new group of experts.

*Participants in the analysis process of the effectiveness of the Architectural Design Education Program.* Children aged six to 11 participated in this process. One primary school, representing the middle socio-economic status, was selected through random sampling from the list, grouping the settlement areas in the provincial center of

Ankara by socioeconomic level provided by the Turkish Statistical Institute (TÜİK) and the list of primary schools affiliated with the Turkish Ministry of National Education (MEB). The school had a total of 30 classes during the academic year 2011-2012. Two groups representing each level of grade/age—a total of 12 classes—were selected randomly among these classes, each to be designated as the experimental and control groups. The distribution is provided in Table 1.

**Table 1**

*Distribution of Children According to Grade/ Age Level and Gender*

| *Grade/Age Level* | *Experimental group (E)* | | | *Control group (C)* | | |
|---|---|---|---|---|---|---|
| | *Female* | *Male* | *Total* | *Female* | *Male* | *Total* |
| Preschool/Age 6 | 8 | 13 | 21 | 9 | 6 | 15 |
| 1th Grade/Age 7 | 13 | 15 | 28 | 16 | 12 | 28 |
| 2nd Grade/Age 8 | 9 | 18 | 27 | 11 | 13 | 24 |
| 3th Grade/Age 9 | 14 | 15 | 29 | 12 | 15 | 27 |
| 4th Grade/Age 10 | 18 | 16 | 34 | 16 | 19 | 35 |
| 5th Grade/Age 11 | 21 | 17 | 38 | 16 | 22 | 38 |
| Total | | | 177 | | | 167 |

Before the study was conducted, the groups were tested to determine whether they were equivalent in terms of design skills. For this purpose, the Taylor-Helmstadter Pair Comparison Test of Aesthetic Judgement (Taylor, 1971; Taylor & Helmstadter, 1971), which was adapted into Turkish culture by Acer (2006) and which tends to measure children's susceptibility of art, design and aesthetic based on the Gestalt Theory of visual perception, was used. Two-way ANOVA for independent samples, used to examine whether there is a significant difference between children's mean scores by the group in which they take place (experimental/control), the level of grade/age and the common impact of group and level of grade/age, yielded the following results:

- Being in the experimental or control group does not result in any significant difference at any level of grade/age with regard to sensitivity to arts, design and aesthetics [$F_{(1-332)}=0.01$, $p>.01$].
- Children's scores differ significantly by the level of grade/age, and children's level of aesthetic judgment increases as their level of grade/age increases [$F_{(5-332)}=114.40$, $p<.01$].
- The common impact of being in different levels of grade/age and being in either the experimental or the control group on the scores of the children is not significant [$F_{(5-332)}=0.06$, $p>.05$].

Thus, at the beginning of the study, the randomized experimental and control groups were equivalent at each level of grade/age.

*Research Instruments and Procedure*

*Adaptation of the Architectural Design Education Program.* The first stage—translating the Teacher's Manual, including all objectives and instructional activities and assuring the linguistic, experiential and semiotic equivalence—was carried out by five expert groups, as described under the previous title. During the second stage, the experts made some revisions on the program. These are:

- adding to the instructional activities in the program some buildings such as the Selimiye Mosque in Edirne, the Irgandı Bridge in Bursa, etc. with which Turkish children may be familiar (Acer & Gözen, 2013),
- transforming the program into a more simple structure by dividing the original 13 education sessions into 16 sessions,
- specifying the objectives of each session by using the cognitive taxonomy for higher-order thinking skills suggested by Haladyna (1997) in order to more fully integrate the instructional activities with today's curriculum and educational assessment terminology, and
- defining additional skills for the design process such as analytical thinking, investigating, verbal and visual communication, visual thinking, and group interaction.

Subsequently, the experts were asked to evaluate each module in the program in terms of criteria such as purpose, technique/methods, materials, and testing. The program was finalized in line with their suggestions.

*Administration of the Architectural Design Education Program*. The administration was carried out in the academic year 2011-2012. Two educators gave the design curriculum, and two researchers of architecture supported the process. The programs were initially planned to last for 16 weeks, sparing three course hours in a week for each of the 16 sessions. However, the final three sessions of the adapted program involved outdoor activities and city tours. Since the program was implemented in the winter and the children's needs in tours could not be met, only the first 13 sessions of the program were completed.

*Performance tasks and rubrics.* At the end of each session, the children fulfilled different performance tasks. The phases of the construction of these tasks were: a) identifying cognitive behaviors intended to be observed and associating the performance with the content of the relevant field/subject, b) assigning the task, c) drawing up the instructions and, d) determining the method of rating. Design means a wide range of activities linking creativity and problem-solving. However, due to limitations of the study, the content of tasks is restricted to the design of two- and three-dimensional illustrations of spaces (e.g. plan drawing, collage work, poster design, garden design, object design, maquette construction, modelling, etc.). In some cases, these illustrations are supported by dynamic/kinesthetic design contexts including the expression of several objects with bodies, role playing/dramatization, and verbal and worded design including oral/written expressions. Considering that

assessment is an integral part of teaching and learning and it covers a whole range of judgements about students (Filer, 2000), a formative assessment tool (Mitchell, 2006)—an analytic rubric—was used in assigning the level of design skills of children based on each performance task. These task-special rubrics, which provide detailed information about the design skill levels of children with regard to differential aspects of the developmental characteristics of each age group (six to 11), differ in terms of the quality and the quantity of criteria (e.g. spatial awareness, visual thinking, surveillance, technical competence, detail and holistic esthetics, etc.) and sub-criteria (e.g. sensitivity to physical environment, imagination, flexibility, use of interdisciplinary concepts, quality of materials, etc.) they involve (Gözen & Acer, 2012).

The validity of the rubrics was evaluated by an expert group in terms of language and expression, appropriateness of context, and appropriateness with respect to measurement and evaluation. Identifying whether multiple raters using the same rating scale at the same time and/or in different periods produce consistent rating or, in other words, testing the reliability of the rubrics, was also an aim. In order to assign reliability, the Pearson product-moment correlation coefficient (Magnusson, 1967, p. 42) was used to examine the level of consistency between two educators on the basis of total scores obtained from the rubrics, and Cohen’s Kappa formula (Krippendorff, 2004) was used to handle the level of consistency between the two educators on the basis of each criterion in the rubric. The analyses showed that there were highly positive and significant correlations ($0.92 \leq r_{xy} \leq 0.99$, $p<.01$) between the scores. This finding confirmed that there was consistency between the two raters, and that the rubrics were reliable in terms of the total scores of children. Moreover, the measurements by Cohen's Kappa formula indicated that the consistency value for each criterion in each rubric was significant ($0.42 \leq k \leq 1.00$, $p<.01$ and $p<.05$). This finding confirmed that the rubrics involved reliable criteria.

*Data Analysis*

As the equivalence of the groups was tested in terms of design skills at the beginning of the study, the significant difference in the mean scores by the level of grade/age, resulting in an increase in level of design skills as the level of grade/age increases, is rather an inevitable finding. Thus, Parsons (1976) states that children ages two to seven make aesthetic judgement using their assessment skills, which is a staple skill in the design process and which is also accepted as a crucial component of critical thinking (Gibson, 1995), in accordance with their instant individual choices. On the other hand, as the age level increases, children make more conscious preferences in their aesthetic judgements. This important finding played a formative role in the development of the performance tasks and rubrics; in this manner, all performance-tasks and task-special rubrics were also constructed as grade and age level-specific. Thus, either based on the nature of these tools and the purpose of the study, the mean design skill scores were compared within each level of grade/age, not reciprocally for different levels of grade/age. For the purpose of this comparison, given that the sample size and normality of distribution determine the type of statistics to be used to test significance, the non-parametric Mann Whitney U-test for

independent samples was used for the analysis. In the analyses, .01 and .05 levels of significance were adopted; and for data analyses, EXCEL 7.0 and SPSS 17.00 were used.

## Results

In this part, the results related to the design skills of children ages six to 11 are presented, respectively. The findings of the first comparison for six-year-old children in differential groups are provided in Table 2.

**Table 2**
*Comparison of Mean Scores of Preschool/ 6-Year-Old Children*

| *Design Product* | *Group* | *N* | $\overline{X}$ | $S_x$ | *Mean Rank* | *Sum of Ranks* | *U* | *p* |
|---|---|---|---|---|---|---|---|---|
| 1 | E | 21 | 16.33 | 5.34 | 24.24 | 509.00 | 16.00** | .00 |
| | C | 14 | 8.14 | 0.36 | 8.64 | 121.00 | | |
| 2 | E | 17 | 48.12 | 12.95 | 21.88 | 372.00 | 2.00** | .00 |
| | C | 13 | 21.38 | 3.55 | 7.15 | 93.00 | | |
| 3 | E | 19 | 21.63 | 8.05 | 22.32 | 424.00 | 32.00** | .00 |
| | C | 14 | 10.14 | 0.36 | 9.79 | 137.00 | | |
| 4 | E | 20 | 30.50 | 9.45 | 22.50 | 450.00 | 0.00** | .00 |
| | C | 12 | 10.83 | 0.94 | 6.50 | 78.00 | | |
| 5 | E | 17 | 26.65 | 7.56 | 21.79 | 370.50 | 37.50** | .00 |
| | C | 15 | 16.00 | 0.00 | 10.50 | 157.50 | | |
| 6 | E | 21 | 12.38 | 3.01 | 23.00 | 483.00 | 0.00** | .00 |
| | C | 12 | 6.50 | 1.09 | 6.50 | 78.00 | | |
| 7 | E | 21 | 53.14 | 3.93 | 23.00 | 483.00 | 0.00** | .00 |
| | C | 12 | 27.00 | 6.25 | 6.50 | 78.00 | | |
| 8 | E | 14 | 13.57 | 4.57 | 17.07 | 239.00 | 48.00** | .00 |
| | C | 13 | 9.62 | 1.39 | 10.69 | 139.00 | | |
| 9 | E | 19 | 28.95 | 9.85 | 20.50 | 389.50 | 9.50** | .00 |
| | C | 11 | 12.82 | 1.83 | 6.86 | 75.50 | | |
| 10 | E | 20 | 75.00 | 0.00 | 24.50 | 490.00 | 0.00** | .00 |
| | C | 14 | 25.00 | 0.00 | 7.50 | 105.00 | | |
| 11 | E | 20 | 38.25 | 10.29 | 22.50 | 450.00 | 0.00** | .00 |
| | C | 12 | 16.33 | 1.50 | 6.50 | 78.00 | | |
| 12 | E | 21 | 92.00 | 0.00 | 25.00 | 525.00 | 0.00** | .00 |
| | C | 14 | 23.21 | 0.80 | 7.50 | 105.00 | | |
| 13 | E | 17 | 42.00 | 11.07 | 20.00 | 340.00 | 0.00** | .00 |
| | C | 11 | 14.18 | 0.60 | 6.00 | 66.00 | | |

**$p<.01$

In the preliminary stage, descriptive statistics showed that the total number of six-year-old children in the experimental group differed between 14 and 21 within different performance tasks whereas the interval was 11-15 for the control group. The biggest difference in the mean scores, which occurred between experimental and

control groups, was observed for the 12th design product [$\overline{X}_{E(12)}$=92.00 and $\overline{X}_{C(12)}$=23.21] while the smallest difference in the mean scores was observed for the 8th [$\overline{X}_{E(8)}$=13.57 and $\overline{X}_{C(8)}$=9.62]. For all products, the design skill levels of children in the experimental group were higher than the levels in the control group. The results also showed that the scores obtained from all products differed significantly by whether children were in the experimental or the control group ($0.00 \leq U_{6[DP(1-13)]} \leq 48.00$, $p<.01$). This finding indicates that the instructional sessions of the adapted program are more effective than the conventional program in improving the design skills of children six years old.

Related to the scores that 1st grade primary school children aged seven received for each performance product, analysis yields the findings presented in Table 3.

**Table 3**
*Comparison of Mean Scores of 1st Grade Primary School/ 7-Year-Old Children*

| *Design Product* | *Group* | *N* | $\overline{X}$ | $S_x$ | *Mean Rank* | *Sum of Ranks* | *U* | *p* |
|---|---|---|---|---|---|---|---|---|
| 1 | E | 25 | 14.92 | 3.91 | 30.04 | 751.00 | 199.00* | .03 |
| | C | 25 | 12.48 | 2.84 | 20.69 | 524.00 | | |
| 2 | E | 26 | 53.88 | 12.51 | 35.85 | 932.00 | 17.00** | .00 |
| | C | 23 | 26.13 | 6.36 | 12.74 | 293.00 | | |
| 3 | E | 26 | 21.81 | 7.57 | 35.06 | 911.50 | 115.50** | .00 |
| | C | 26 | 14.69 | 4.05 | 17.94 | 466.50 | | |
| 4 | E | 24 | 23.92 | 8.55 | 35.83 | 860.00 | 88.00** | .00 |
| | C | 27 | 14.07 | 4.02 | 17.26 | 466.00 | | |
| 5 | E | 26 | 38.42 | 11.19 | 35.94 | 934.50 | 66.50** | .00 |
| | C | 25 | 21.48 | 4.50 | 15.66 | 391.50 | | |
| 6 | E | 26 | 12.46 | 3.57 | 34.37 | 893.50 | 107.50** | .00 |
| | C | 25 | 8.72 | 1.74 | 17.30 | 432.50 | | |
| 7 | E | 27 | 53.85 | 0.77 | 38.00 | 1026.00 | 0.00** | .00 |
| | C | 24 | 24.54 | 6.39 | 12.50 | 300.00 | | |
| 8 | E | 25 | 13.20 | 3.79 | 30.28 | 757.00 | 143.00** | .00 |
| | C | 23 | 10.00 | 1.65 | 18.22 | 419.00 | | |
| 9 | E | 27 | 36.26 | 7.96 | 39.89 | 1077.00 | 30.00** | .00 |
| | C | 27 | 20.89 | 1.74 | 15.11 | 408.00 | | |
| 10 | E | 27 | 75.00 | 0.00 | 40.00 | 1080.00 | 0.00** | .00 |
| | C | 26 | 20.00 | 3.41 | 13.50 | 351.00 | | |
| 11 | E | 22 | 45.00 | 13.89 | 33.89 | 745.50 | 13.50** | .00 |
| | C | 23 | 24.61 | 4.46 | 12.59 | 289.50 | | |
| 12 | E | 25 | 92.00 | 0.00 | 36.00 | 900.00 | 0.00** | .00 |
| | C | 23 | 27.17 | 1.50 | 12.00 | 276.00 | | |
| 13 | E | 22 | 44.55 | 10.26 | 36.50 | 803.00 | 0.00** | .00 |
| | C | 25 | 14.68 | 1.07 | 13.00 | 325.00 | | |

*p<.05 **p<.01

The total number of seven-year-old children in the experimental group differed between 22 and 27 within differential performance tasks, whereas the range is 23-27 in the control group. Descriptive statistics suggest that the children in the experimental group had significantly higher scores than the children in the control group with regard to products in all sessions and the maximum mean scores' difference was observed for the 12th design product [$\overline{X}_{E(12)}$=92.00 and $\overline{X}_{C(12)}$=27.17] while the minimum difference was observed for the 1st [$\overline{X}_{E(1)}$=14.92 and $\overline{X}_{C(1)}$=12.48]. In addition, the average ranks within the U-test again showed the same results, presenting that the scores children obtained from all products differed significantly by the group in which they had been ($0.00 \leq U_{7[DP(1-13)]} \leq 199.00$, $p<.05$ and $p<.01$). As was the case for children six years old, this finding shows that the adapted program is effective in improving the design skills of seven-year-old children.

A similar analysis was conducted for eight-year-old children in the 2nd grade and analysis yields the findings provided in Table 4.

**Table 4**

*Comparison of Mean Scores of 2nd Grade Primary School/ 8-Year-Old Children*

| *Design Product* | *Group* | ***N*** | $\overline{X}$ | $S_x$ | *Mean Rank* | *Sum of Ranks* | ***U*** | ***p*** |
|---|---|---|---|---|---|---|---|---|
| 1 | E | 27 | 22.63 | 5.86 | 32.15 | 868.00 | 77.00** | .00 |
| | C | 21 | 15.57 | 2.77 | 14.67 | 308.00 | | |
| 2 | E | 22 | 55.50 | 12.91 | 33.59 | 739.00 | 20.00** | .00 |
| | C | 23 | 27.39 | 8.27 | 12.87 | 296.00 | | |
| 3 | E | 26 | 31.23 | 9.80 | 33.35 | 867.00 | 56.00** | .00 |
| | C | 22 | 14.91 | 4.31 | 14.05 | 309.00 | | |
| 4 | E | 22 | 21.82 | 4.36 | 24.14 | 531.00 | 118.00* | .03 |
| | C | 18 | 17.78 | 4.22 | 16.06 | 289.00 | | |
| 5 | E | 26 | 33.23 | 4.35 | 36.50 | 949.00 | 0.00** | .00 |
| | C | 23 | 18.87 | 4.70 | 12.00 | 276.00 | | |
| 6 | E | 25 | 17.00 | 3.82 | 31.40 | 785.00 | 40.00** | .00 |
| | C | 20 | 9.90 | 2.63 | 12.50 | 250.00 | | |
| 7 | E | 27 | 54.00 | 0.00 | 34.00 | 918.00 | 0.00** | .00 |
| | C | 20 | 29.95 | 6.38 | 10.50 | 210.00 | | |
| 8 | E | 21 | 15.95 | 3.75 | 29.43 | 618.00 | 54.00** | .00 |
| | C | 21 | 11.24 | 1.92 | 13.57 | 285.00 | | |
| 9 | E | 26 | 34.27 | 5.67 | 33.50 | 871.00 | 0.00** | .00 |
| | C | 20 | 16.00 | 0.00 | 10.50 | 210.00 | | |
| 10 | E | 27 | 75.00 | 0.00 | 35.00 | 945.00 | 0.00** | .00 |
| | C | 21 | 25.48 | 1.25 | 11.00 | 231.00 | | |
| 11 | E | 24 | 49.38 | 9.36 | 32.50 | 780.00 | 0.00** | .00 |
| | C | 20 | 17.65 | 2.60 | 10.20 | 210.00 | | |
| 12 | E | 27 | 92.00 | 0.00 | 34.00 | 918.00 | 0.00** | .00 |
| | C | 20 | 26.75 | 1.33 | 10.50 | 210.00 | | |
| 13 | E | 26 | 46.85 | 10.43 | 34.50 | 897.00 | 0.00** | .00 |
| | C | 21 | 15.71 | 2.05 | 11.00 | 231.00 | | |

*p<.05 **p<.01

In consideration of the differential performance tasks, the total number of eight-year-old children in the experimental group differed between 21 and 27, whereas the total number of children in the control group ranged between 18 and 23. Descriptive statistics showed that the maximum mean scores' difference was observed for the 12th design product between differential groups [$\overline{X}_{E(12)}$=92.00 and $\overline{X}_{C(12)}$=26.75], while the minimum difference was observed for the 4th [$\overline{X}_{E(4)}$=21.82 and $\overline{X}_{C(4)}$=17.78]. Accordingly, checking whether their performance scores differed significantly by whether they were in the experimental or the control group yields findings which indicated that, among eight-year-old children, there was a significant difference in the level of design skills for all design products, and children in the experimental group had higher levels of skills ($0.00 \leq U_{8[DP(1\text{-}13)]} \leq 118.00$, $p<.05$ and $p<.01$). Along the same lines with the findings for children ages six and seven, the adapted program is effective in developing the design skills of eight-year-old children.

These analyses were followed by those for 3rd grade children at the age of nine and the findings are available in Table 5.

**Table 5**

*Comparison of Mean Scores of 3rd Grade Primary School/ 9-Year-Old Children*

| *Design Product* | *Group* | *N* | $\overline{X}$ | $S_x$ | *Mean Rank* | *Sum of Ranks* | ***U*** | ***p*** |
|---|---|---|---|---|---|---|---|---|
| 1 | E | 28 | 29.00 | 5.72 | 39.71 | 1112.00 | 22.00** | .00 |
| | C | 26 | 15.04 | 3.32 | 14.35 | 373.00 | | |
| 2 | E | 29 | 59.97 | 11.50 | 38.05 | 1103.50 | 27.50** | .00 |
| | C | 24 | 34.83 | 8.12 | 13.65 | 327.50 | | |
| 3 | E | 27 | 32.33 | 8.11 | 38.72 | 1045.50 | 7.50** | .00 |
| | C | 25 | 13.72 | 3.30 | 13.30 | 332.50 | | |
| 4 | E | 28 | 33.21 | 8.19 | 37.64 | 1054.00 | 24.00** | .00 |
| | C | 24 | 13.38 | 4.06 | 13.50 | 324.00 | | |
| 5 | E | 29 | 42.97 | 11.39 | 34.02 | 986.50 | 28.50** | .00 |
| | C | 20 | 21.10 | 5.11 | 11.93 | 238.50 | | |
| 6 | E | 28 | 16.07 | 4.16 | 37.25 | 1043.00 | 119.00** | .00 |
| | C | 27 | 10.26 | 1.51 | 18.41 | 497.00 | | |
| 7 | E | 29 | 54.00 | 0.00 | 38.00 | 1102.00 | 0.00** | .00 |
| | C | 23 | 30.30 | 6.50 | 12.00 | 276.00 | | |
| 8 | E | 28 | 16.96 | 2.83 | 41.00 | 1148.00 | 14.00** | .00 |
| | C | 27 | 9.74 | 1.77 | 14.52 | 392.00 | | |
| 9 | E | 27 | 34.63 | 7.29 | 39.26 | 1060.00 | 20.00** | .00 |
| | C | 26 | 16.88 | 5.09 | 14.27 | 371.00 | | |

**Table 5 Continue**

| Design Product | Group | N | $\overline{X}$ | $S_x$ | Mean Rank | Sum of Ranks | U | p |
|---|---|---|---|---|---|---|---|---|
| 10 | E | 29 | 75.00 | 0.00 | 39.00 | 1131.00 | 0.00** | .00 |
| | C | 24 | 27.96 | 2.63 | 12.50 | 300.00 | | |
| 11 | E | 29 | 47.07 | 11.14 | 38.38 | 1113.00 | 18.00** | .00 |
| | C | 24 | 25.50 | 4.53 | 13.25 | 318.00 | | |
| 12 | E | 29 | 92.00 | 0.00 | 42.00 | 1218.00 | 0.00** | .00 |
| | C | 27 | 27.00 | 1.44 | 14.00 | 378.00 | | |
| 13 | E | 27 | 45.11 | 11.21 | 37.00 | 999.00 | 0.00** | .00 |
| | C | 23 | 15.61 | 1.67 | 12.00 | 276.00 | | |

$^{**}p<.01$

The total number of nine-year-old children attending the experimental group differed between 27 and 29 whereas the interval was 20-27 for the control group within differential performance tasks. The maximum difference in the mean scores was observed for the 12th design product between differential groups [$\overline{X}_{E(12)}$=92.00 and $\overline{X}_{C(12)}$=27.00] while the minimum difference was observed for the 6th [$\overline{X}_{E(6)}$=16.07 and $\overline{X}_{C(6)}$=10.26]. Moreover, it was observed that the level of design skills of nine-year-old children in the experimental group was higher compared to children in the control group with respect to all performance products; and the analyses indicate that the difference between the two groups was significant ($0.00 \leq U_{9[DP(1-13)]} \leq 119.00$, $p<.01$). As was the case in the previous groups, this finding suggests that the program adapted is effective in improving the design skills of nine-year-old children.

For 4th grade children at the age of ten, the significance of the differences between mean performance scores is provided in Table 6.

**Table 6**

*Comparison of Mean Scores of 4th Grade Primary School/ 10-Year-Old Children*

| Design Product | Group | N | $\overline{X}$ | $S_x$ | Mean Rank | Sum of Ranks | U | p |
|---|---|---|---|---|---|---|---|---|
| 1 | E | 34 | 25.68 | 5.76 | 47.76 | 1624.00 | 93.00** | .00 |
| | C | 33 | 15.94 | 3.76 | 19.82 | 654.00 | | |
| 2 | E | 32 | 50.94 | 8.73 | 47.83 | 1530.50 | 53.50** | .00 |
| | C | 33 | 32.33 | 5.88 | 18.62 | 614.50 | | |
| 3 | E | 32 | 32.38 | 7.87 | 49.14 | 1572.50 | 11.50** | .00 |
| | C | 33 | 13.12 | 3.13 | 17.35 | 572.50 | | |
| 4 | E | 34 | 30.59 | 8.14 | 49.91 | 1697.00 | 20.00** | .00 |
| | C | 33 | 15.48 | 3.32 | 17.61 | 581.00 | | |
| 5 | E | 34 | 49.88 | 10.98 | 52.50 | 1785.00 | 0.00** | .00 |
| | C | 35 | 16.00 | 0.00 | 18.00 | 630.00 | | |
| 6 | E | 33 | 14.70 | 3.74 | 41.27 | 1362.00 | 255.00** | .00 |
| | C | 32 | 10.97 | 1.33 | 24.47 | 783.00 | | |
| 7 | E | 34 | 54.00 | 0.00 | 49.50 | 1683.00 | 0.00** | .00 |
| | C | 32 | 26.66 | 5.13 | 16.50 | 528.00 | | |

**Table 6 Continue**

| *Design Product* | *Group* | **N** | $\overline{X}$ | $S_x$ | *Mean Rank* | *Sum of Ranks* | **U** | **p** |
|---|---|---|---|---|---|---|---|---|
| 8 | E | 32 | 15.78 | 3.83 | 44.16 | 1413.00 | 171.00** | .00 |
| | C | 33 | 10.70 | 1.31 | 22.18 | 732.00 | | |
| 9 | E | 32 | 36.09 | 6.98 | 51.50 | 1648.00 | 0.00** | .00 |
| | C | 35 | 12.97 | 1.58 | 18.00 | 630.00 | | |
| 10 | E | 34 | 75.00 | 0.00 | 52.50 | 1785.00 | 0.00** | .00 |
| | C | 35 | 33.03 | 2.42 | 18.00 | 630.00 | | |
| 11 | E | 31 | 48.87 | 10.22 | 49.68 | 1540.00 | 10.00** | .00 |
| | C | 34 | 21.32 | 5.19 | 17.79 | 605.00 | | |
| 12 | E | 34 | 92.00 | 0.00 | 52.50 | 1785.00 | 0.00** | .00 |
| | C | 35 | 26.77 | 1.33 | 18.00 | 630.00 | | |
| 13 | E | 32 | 45.94 | 10.20 | 48.50 | 1552.00 | 0.00** | .00 |
| | C | 32 | 16.31 | 2.26 | 16.50 | 528.00 | | |

**p<.01

The total number of 4th grade children attending the experimental group differed between 31 and 34, whereas this interval was 32-35 for the control group within differential performance tasks. The maximum difference in the mean scores was again observed for the 12th design product between differential groups [$\overline{X}_{E(12)}$=92.00 and $\overline{X}_{C(12)}$=26.77] whereas the minimum difference was observed for the 6th [$\overline{X}_{E(6)}$=14.70 and $\overline{X}_{C(6)}$=10.97]. Comparison of mean scores shows that the group variable yielded a significant difference in mean scores that children obtained for each design product, and that the difference was in favor of the experimental group ($0.00 \leq U_{10[DP(1-13)]} \leq 255.00$, $p<.01$). This finding is comparable with the findings related to other age groups, suggesting that the program adapted is more effective than conventional activities in improving the design skills of children aged 10.

The final analysis was with the data collected from 5th grade children at the age of 11. The findings obtained are presented in Table 7.

**Table 7**
*Comparison of Mean Scores of 5th Grade Primary School/ 11-Year-Old Children*

| *Design Product* | *Group* | *N* | $\overline{X}$ | $S_x$ | *Mean Rank* | *Sum of Ranks* | *U* | *p* |
|---|---|---|---|---|---|---|---|---|
| 1 | E | 34 | 24.91 | 6.22 | 46.71 | 1588.00 | 95.00** | .00 |
| | C | 32 | 16.13 | 2.69 | 19.47 | 623.00 | | |
| 2 | E | 35 | 55.11 | 9.84 | 54.33 | 1901.50 | 23.50** | .00 |
| | C | 37 | 35.38 | 3.47 | 19.64 | 726.50 | | |
| 3 | E | 34 | 28.26 | 8.55 | 49.75 | 1691.50 | 127.50** | .00 |
| | C | 36 | 17.03 | 4.23 | 22.04 | 793.50 | | |
| 4 | E | 37 | 30.30 | 7.22 | 51.70 | 1913.00 | 122.00** | .00 |
| | C | 36 | 18.56 | 3.52 | 21.89 | 788.00 | | |
| 5 | E | 38 | 48.00 | 0.00 | 54.50 | 2071.00 | 0.00** | .00 |
| | C | 35 | 26.20 | 5.60 | 18.00 | 630.00 | | |
| 6 | E | 38 | 14.87 | 3.18 | 52.55 | 1997.00 | 188.00** | .00 |
| | C | 38 | 10.42 | 1.22 | 24.45 | 929.00 | | |
| 7 | E | 38 | 54.00 | 0.00 | 51.50 | 1957.00 | 0.00** | .00 |
| | C | 32 | 24.94 | 4.97 | 16.50 | 528.00 | | |
| 8 | E | 34 | 15.74 | 4.63 | 44.15 | 1501.00 | 318.00** | .00 |
| | C | 36 | 10.92 | 1.98 | 27.33 | 984.00 | | |
| 9 | E | 34 | 35.91 | 5.62 | 49.50 | 1683.00 | 0.00** | .00 |
| | C | 32 | 16.00 | 2.65 | 16.50 | 528.00 | | |
| 10 | E | 38 | 75.00 | 0.00 | 54.50 | 2071.00 | 0.00** | .00 |
| | C | 35 | 29.57 | 2.64 | 18.00 | 630.00 | | |
| 11 | E | 33 | 51.82 | 8.46 | 49.33 | 1628.00 | 22.00** | .00 |
| | C | 33 | 29.30 | 4.10 | 17.67 | 583.00 | | |
| 12 | E | 38 | 92.00 | 0.00 | 57.50 | 2185.00 | 0.00** | .00 |
| | C | 38 | 26.79 | 1.34 | 19.50 | 741.00 | | |
| 13 | E | 35 | 45.20 | 10.23 | 53.83 | 1884.00 | 6.00** | .00 |
| | C | 36 | 19.92 | 2.51 | 18.67 | 672.00 | | |

**$p<.01$

In consideration of the differential performance tasks, the total number of 11-year-old children in the experimental group differed between 33 and 38 whereas the total number ranged between 32 and 38 for the control group. Descriptive statistics showed that the maximum difference in the mean scores was observed for the 12th design product between differential groups [$\overline{X}_{E(12)}=92.00$ and $\overline{X}_{C(12)}=26.79$] whereas the minimum difference was observed for the 6th [$\overline{X}_{E(6)}=14.87$ and $\overline{X}_{C(6)}=10.42$]. Analysis showed that the mean scores of 11-year-old children obtained in all performance tasks were significantly different in favor of children in the experimental group ($0.00 \leq U_{11[DP(1-13)]} \leq 318.00$, $p<.01$). This finding, consistent with the

findings for children in the age group six to 10, suggests that the instructional sessions implemented within the Architectural Design Education Program are more effective than conventional activities to improve the design skills of children aged 11.

## Discussion and Conclusion

In an increasingly complex and rapidly-evolving society, there is an ever-growing need for solid cultural competencies and up-to-date knowledge in teaching and learning processes. As a result, more than ever, the new problems faced by educational and socio-cultural services call for individuals capable of performing higher-order thinking skills. It is no wonder that today both public and private socio-education services have witnessed an increasing demand for individuals with creativity. As a matter of fact, as mentioned by Piaget (1970), the main purpose of education is to raise individuals that not only repeat what the former generations did but are also powerful enough to do something new. Today, this point of view still finds support. Mentioning the common education policies around the world (e.g. set by Greek Government Law 1566/1985, Greek Pedagogical Institute, 2003; Department for Education and Employment/Qualifications and Curriculum Authority, 2004; Qualifications and Curriculum Authority, 2005; Ministerial Council for Education, Early Childhood Development and Youth Affairs, 2008), Kampylis (2010) points out that creative thinking is among the key thinking skills that students need to develop through formal education. Accordingly, findings of several researches (Faizi et al., 2013; Kinchin & O'Connor, 2012; Lozanovska & Xu, 2012; Meskanen & Hummelin, 2010; Rauth et al., 2010; Räsänen, 2014; Ulaş-Dağlı, Paşaoğluları-Şahin, & Güley, 2013) validate that design education, as a base of knowledge about creativity, could provide many benefits to children and youth—and, therefore, to the future society—such as increasing creative problem-solving ability, developing self-confidence, improving social skills and cultural knowledge and reinforcing aesthetic value and other applicable skills. Consistent with these determinations and expectations, the findings of this study suggest that there are significant differences regarding the development of design skills.at all levels of grade/age between the experimental group that participated in the Architectural Design Education Program and the control group that participated in conventional activities. Based on these findings and discussions through the relevant literature on the concept of design, it is thought that this significant difference in terms of design skills indicates a subsequent improvement in many complicated, high-level cognitive qualities, including particularly creative thinking and problem-solving skills.

The results obtained and given, respectively, in line with the purposes of this study are of particular significance because they suggest that the instructional sessions implemented within the Architectural Design Education Program which was adapted into Turkish culture are more effective than conventional activities to improve the design skills of Turkish children aged six to 11. Given that this program provides a rich learning environment in psychological, educational and social terms, the children furnished with the behaviors that the program intends to yield are

expected to be individuals that have a deep understanding of and question themselves, the space in which they are and the city in which they live, think critically and creatively, solve problems effectively and have developed perceptions and awareness of the environment. As the awareness level of the individuals that take this program increases, they are expected to be more open to communication, express themselves comfortably, and carry out teamwork collaboratively. Furthermore, as their aesthetic judgment develops, they will internalize and enjoy the arts. These personality traits will allow them to transform creatively all other beings that they interact with. Thus, based on all of the discussions given, it is concluded that the Architectural Design Education Program, adapted into the Turkish culture, plays an effective role in improving children's design skills and is useful for the social, emotional and cognitive development of children.

It is important to support and develop the design competence of the individuals from an early age through appropriate design-based art education programs that mainly focus on spaces, senses and the creative problem-solving skills of children. Thus, the need for learning through the arts and from the arts exists already in the child. Architecture and design-based art education has not yet, however, become an established part of the curricula of schools. In this respect, it is recommended that the Architectural Design Education Program, a multidisciplinary program making use of various fields such as mathematics, history, science and arts, is integrated with preschool, primary and secondary education programs to enhance its effectiveness. It is also important to carry out studies to determine the effectiveness of the program in different age groups and to adapt the program for different age groups.

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**Çocuklar için Mimari Tasarım Öğretim Programı:**

**Türk Kültürüne Uyarlanması ve Etkililiğinin Analiz Edilmesi**

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**Özet**

*Problem Durumu:* Tasarım; özgün bir ürün oluşturmak üzere fikir, çizim, bilgi vb. bileşenlerin bağdaştırıldığı karmaşık bir süreçtir. Fiziksel dünyayı değiştirerek ona estetik bir uyum vermek üzere çocukların özgün fikirler ortaya atmalarını desteklemek, onlarda arayış, deneyim ve keşif sürecini desteklemekte, başta yaratıcı düşünme ve problem çözme becerisi olmak üzere diğer pek çok üst düzey düşünme becerisinin gelişimine katkıda bulunmaktadır. Bu nedenle, doğuştan tasarımcı olan her insanın bu yetisinin, uygun eğitim programları ile erken yaşlardan itibaren desteklenmesi ve geliştirilmesi son derece önemlidir. Çocuklara içinde bulundukları çevreye, doğaya ve mekanlara ilişkin söz hakkı tanımak ve yaratıcı düşünen, problem çözebilen, eleştirel düşünen, kültürel birikim ve sorumluluk sahibi bireyler olmalarına katkıda bulunmak, onlara verilecek sistemli bir tasarım eğitimi ile mümkündür. Ancak Türkiye'de, çocuklara yönelik bir tasarım eğitimi programı bulunmamaktadır.

*Araştırmanın Amacı:* Bu çalışmanın amacı; anaokulundan lise çağına kadar olan çocuklara tasarıma ilişkin bilgi ve becerileri kazandıran, yaratıcı düşünme ve problem çözme becerilerinin gelişimini destekleyen, onları içinde bulundukları eğitim mekânlarını tasarlayabilen, içinde yaşadıkları dünyaya duyarlı bireyler haline getirmeyi amaçlayan ve Amerika Birleşik Devletleri'nde 30 yıla yakın bir süredir uygulanan Çocuklar için Mimari Tasarım Öğretim Programı'nı okulöncesi ve 1-5. sınıf düzeyinde öğrenim gören 6-11 yaş grubu Türk çocukları için uyarlamak ve uyarlanmış programın etkililiğini analiz etmektir.

*Araştırmanın Yöntemi:* Mimari Tasarım Öğretim Programı'nın Türk kültürüne uyarlanması, uzman gruplarının çalışmalarıyla gerçekleştirilmiş, uyarlamanın farklı adımlarında o adımın içeriğine (orijinal programın Türk diline çevrilmesi, orijinal dile geri-çeviri süreci, programın içeriğinin deneyimsel, kavramsal ve anlamsal eşdeğerliğinin belirlenmesi, içeriğin Tük kültürüne özgü öğelerle donatılması ve incelenmesi) bağlı olarak ölçüt örnekleme tekniğiyle oluşturulmuş beş farklı uzman grubu görev almıştır. Programın etkililiğinin belirlenmesinde son-test kontrol gruplu deneysel bir çalışma yürütülmüştür. Uyarlanan program 2011-2012 öğretim yılı güz

döneminde 13 hafta boyunca, Ankara ili merkez ilçesinde bulunan orta sosyoekonomik düzeydeki bir ilkokulun okulöncesi ve 1-5. sınıf düzeylerinde öğrenim görmekte olan 6-11 yaş arasındaki toplam 177 çocuğa uygulanmıştır. Bu çocuklar, her bir sınıf/yaş düzeyini temsil eden altı farklı deney grubunu oluştururken, aynı özelliklere sahip altı kontrol grubunda yer alan toplam 167 çocuğa ise daha geleneksel etkinliklerden oluşan bir program uygulanmıştır. Programın uygulanması süresince, her bir oturum sonrasında çocuklara mimari tasarım odaklı performans görevleri verilmiştir. Görevler doğrultusunda tasarlanan iki ve/veya üç boyutlu ürünler ise araştırmacı tarafından geliştirilen, geçerli ve güvenilir araçlar oldukları kanıtlanan göreve-özel analitik dereceli puanlama anahtarları ile değerlendirilmiştir. Bu anahtarlar ile yapılan değerlendirmelerin sonuçları, çocukların tasarım becerisi düzeylerinin göstergesi olarak tanımlanmıştır. Farklı yaş gruplarındaki çocukların estetik yargı açısından tercih yapma ve karar verme süreçlerindeki gelişimsel farklılıklar, tasarım odaklı performans görevlerinin ve her bir göreve özgü dereceli puanlama anahtarının geliştirilmesi sürecinde biçimlendirici bir rol oynamıştır. Tüm performans görevleri ve görevlere özel anahtarlar aynı zamanda "sınıf düzeyine ve yaşa özel" bir yapıya da sahip olacak şekilde (yaş gruplarına göre farklı sayıda ve nitelikte değerlendirme ölçütleri içerecek biçimde) geliştirilmiştir. Ölçme araçlarının bu yapısı ve araştırmanın amacı göz önünde bulundurularak, programın uygulandığı deney grubunda ve geleneksel tasarım etkinliklerini içeren öğretim programının uygulandığı kontrol grubunda yer alan çocukların tasarım ürünlerine dayalı performans puanlarının ortalamaları, farklı sınıf/yaş düzeyleri için karşılıklı olarak değil, her sınıf/yaş düzeyi için kendi içinde karşılaştırılmıştır. Bu karşılaştırmada, örneklem büyüklüğünün kullanılacak istatistiğin türü açısından belirleyici olması göz önünde bulundurularak parametrik olmayan bir istatistik olan ilişkisiz ölçümler için Mann Whitney U-testinden yararlanılmıştır. Analizlerde .01 ve .05 manidarlık düzeyleri benimsenmiş, EXCEL 7.0 ve SPSS 17.00 paket programlarından yararlanılmıştır.

*Araştırmanın Bulguları:* İstatistiksel analizler sonucunda; 13 farklı performans görevi ürününe dayalı tasarım becerilerinin gelişimi açısından, deney ve kontrol grupları arasında tüm sınıf/yaş düzeylerindeki deney gruplarının lehine manidar farklar elde edilmiştir.

*Araştırmanın Sonuçları ve Önerileri:* Yaratıcı düşünme; temel düzeydeki örgün eğitim ile geliştirilmesi zorunlu olan bir anahtar düşünme becerisidir. Tasarım eğitimi ise yaratıcılığın gelişiminde önemli bir görev görmektedir çünkü tasarımın kendisi başlı başına bir yaratma etkinliğidir. Bu araştırmanın bulguları, Türk kültürüne uyarlanan Mimari Tasarım Öğretimi Programı'nın 6-11 yaş çocuklarının tasarım becerilerini geliştirmede etkili bir program olduğunu göstermiştir. Programın, bu etkisiyle, çocukların başta yaratıcı düşünme ve problem çözme becerisi olmak üzere üst düzey düşünme süreçlerine dayalı bilişsel, sosyal ve duygusal gelişimlerini desteklediği söylenebilir. Bu göz önünde bulundurularak, matematik, tarih, fen ve sanattan yararlanan, çoklu zekaya dayalı ve disiplinler arası bir program olan Mimari Tasarım

Öğretimi Programı'nın, okulöncesi, ilkokul, ortaokul ve lise öğretim programlarındaki temel öğrenme alanları (dil bilgisi, matematik, fen ve teknoloji, sanat vb.) ile bütünleştirilmesi ve böylece etkililiğinin artırılması önerilmektedir.

*Anahtar Sözcükler*: Çocuk, tasarım, yaratıcılık, problem çözme, eğitim.